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Oxidized regenerated cellulose granuloma mimicking recurrent mass lesion after laparoscopic nephron sparing surgery

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ABSTRACT

INTRODUCTION: Achieving hemostasis in laparoscopic nephron sparing surgery (LNSS), a technically demanding procedure, is challenging. Absorbable hemostatic agents, such as oxidized regenerated cellulose (ORC) are frequently used for hemostasis in laparoscopic nephron sparing surgery. Retention of this material is a very rare situation.
PRESENTATION OF THE CASE: We are presenting a case of ORC granuloma after nephron sparing surgery for renal cell carcinoma (RCC) mimicking recurrent renal mass. A 50-year-old woman diagnosed with upper pole renal mass underwent laparoscopic nephron sparing surgery. Oxidized regenerated cellulose was used to achieve hemostasis for an oozing from the perirenal tissue. Resection confirmed RCC. Imaging at 6th month follow-up revealed a lesion with contrast enhancement at the location of the adrenal gland. Positron emission tomography suggested inflammation or metastasis. Histopathological evaluation of the mass revealed foreign body granuloma.
DISCUSSION: Laparoscopic nephron sparing surgery is becoming a standardized treatment of select renal tumors. Hemostatic agents, such as ORC, are frequently used to minimize complications in LNSS. In case of ORC application, which is completely absorbed in 8 weeks, to or to a location with close proximity to the primary resection site, surgical granuloma formation should be considered. However its use should not be discouraged and biopsy may be considered for definitive diagnosis.
CONCLUSION: Oxidized regenerated cellulose granuloma may mimic different entities such as including invasive carcinoma. Thus it is of utmost importance, if ORC was used during LNSS, the location and use of this material should be noted precisely.

1. Introduction

Laparoscopic nephron sparing surgery (LNSS) has gained popularity as a feasible but technically advanced minimally invasive procedure for treating selected renal tumors.[1] Challenges in the surgical technique are mainly achieving hemostasis and caliceal and renal parenchyma repair during a limited time.[2] Hemostatic agents (HAs) are a valuable tool regarding this challenge. Bioabsorbable HAs are often left in the surgical bed to prevent rebleeding after surgical closure. Since the first introduction of fibrin in 1909 many HAs have been widely used to achieve intraoperative hemostasis in the surgical field.[3] Tissue sealants as renal HAs have been in use for over 25 years, such as, oxidized regenerated cellulose (ORC), which was first introduced in 1960.[3,5] The use of HAs have been proven to be safe during LNSS.[6] One of the drawbacks of ORC is the retention of the material which was first described by Vanderhoof and Merendino in 1949.[7] Herein, we discuss a retained absorbable ORC material mimicking recurrent mass lesion following LNSS.

2. Case report

A 50-year-old woman diagnosed with incidental 43 mm × 32 mm upper pole posterior renal mass on left kidney underwent LNSS (Fig. 1). During surgery, oxidized regenerated cellulose (Surgicel®, Ethicon, Somerville, NJ, USA) was used to achieve hemostasis for an oozing around perirenal tissue close to both primary tumor and adrenal gland while liberating the kidney. Pathology revealed T1b cystic papillary renal cell carcinoma (RCC) with Fuhrman nuclear Grade 2 and negative surgical margins. Computerized tomography (CT) and magnetic resonance imaging (MRI) showed a 30 mm × 20 mm mass with peripheral enhanced ring on the ipsilateral adrenal gland at 6th month follow-up (Fig. 2). Hematoma or metastasis could not be ruled out. Positron emission tomography (PET) revealed a recurrent mass suggesting inflammation or adrenal metastasis of RCC. Thus, laparoscopic exploration of the mass was planned. Three port transperitoneal laparoscopic approach was the method of choice.

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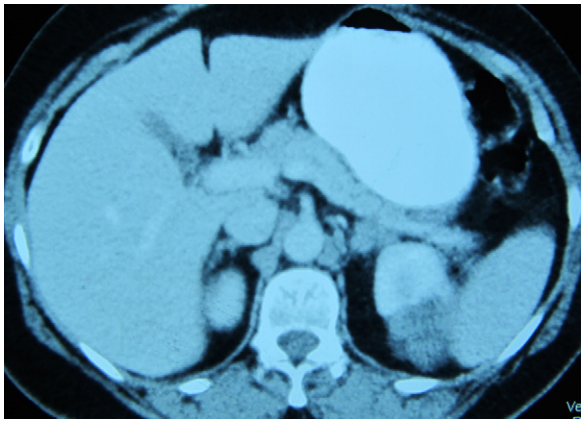

Fig. 1. A computerized tomography image of 43 mm × 32 mm upper pole posterior renal mass with contrast enhancement.

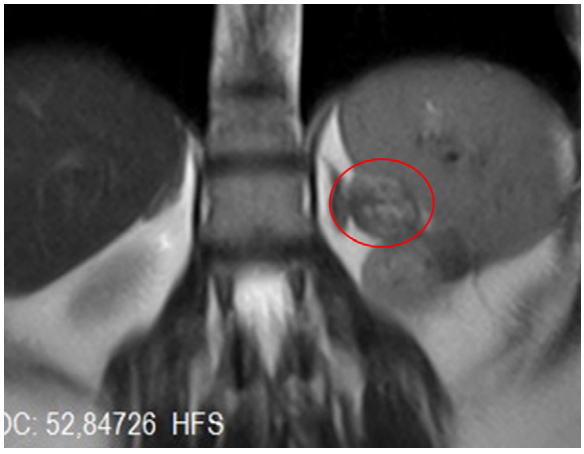

Fig. 2. A magnetic resonance image of 30 mm × 20 mm mass with peripheral enhanced ring.

Briefly, the patient was placed in 45–60° modified flank position. A Veress needle was used to create a 15 mmHg pneumoperitoneum. Following the placement of a 10 mm trocar lateral to the umbilicus the camera was introduced into the abdominal cavity. A 12 mm port was placed between the anterosuperior iliac spine and the umbilicus, while a 5 mm port was placed at the midclavicular line 2 cm below the costal margin. Descending colon was reflected medially exposing the retroperitoneum clearly. The mass was identified superior to the upper pole and a gelatinous sponge-like material was protruded immediately upon its unintended perforation (Fig. 3). The gelatinous material was sent to frozen section and

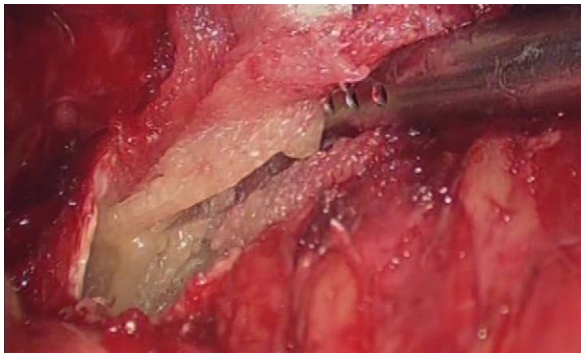

Fig. 3. A snapshot taken during the operation showing the gelatinous sponge-like material surrounded by a pseudocapsule.

Fig. 4. Macroscopic image of the mass showing microcystic cut surface.

histopathology confirmed foreign body. The operation time, estimated blood loss and hospital stay was 80 min, 100 mL and 2 days, respectively. The postoperative course was uneventful.

On macroscopic examination the mass showed microcystic cut surface (Fig. 4). On microscopic examination the mass was composed of pieces of foreign material displaying basophilic, homogenous appearance with irregular borders (Fig. 5a and b).

3. Discussion

As becoming increasingly standardized in the treatment of select renal tumors, LNSS appears to be equivalent to open nephron sparing surgery regarding intermediate oncologic outcomes in experienced hands. The local recurrence after LNSS for T1b RCC is not common.[8] Positive margin status does not necessarily indicate residual disease and translate into disease progression, as only 4% of patients with positive margins will develop local recurrence.[9] Follow-up regimes recommend chest X-ray, ultrasound and CT in each alternative year.[10] In the present case, it was rather unusual to detect a lesion suggesting adrenal metastasis in a case with pT1b RCC with negative surgical margins. However, close relationship of the primary resection site and the adrenal mass leaded us considering this lesion as metastasis or local recurrence. Thus surgical exploration was planned. It should be mentioned that if ORC was applied to the primary resection site or to a location with close proximity to the resection site, one should consider surgical granuloma formation in a particular case with recurrent mass after LNSS. In this situation, biopsy may be the preferred modality to prevent a complicated surgery for removing the mass.

Topical HAs have been increasingly used in improving hemostasis in a variety of surgical interventions. The usage of HAs accelerated parenchymal hemostasis while reducing hemorrhage and urinary extravasation regarding complications in LNSS. One of the most commonly used materials in LNSS, ORC, is bio-absorbable fabric developed by controlled chemical oxidation of cellulose.[11] It is an oxidized cellulose polymer (the functional unit is polyanhydroglucuronic acid) that is believed to act as a template for coagulation of bleeding vessels. The properties of this material were delineated in the middle of twentieth century by Frantz and since it has been widely used to achieve intraoperative hemostasis.[4] Oxidized cellulose bind with hemoglobin and accelerates formation of artificial clot and aggregation of platelets.[12] Is formed by dissolving pure alpha-cellulose in an alkaline solution. It is then regenerated into continuous fiber, knitted into gauze, and oxidized.[13] Under microscopic examination it is composed of solid fibers with irregular contours on cross-section, stain weakly eosinophilic or occasionally light purple with H&E and show no birefringence. Its

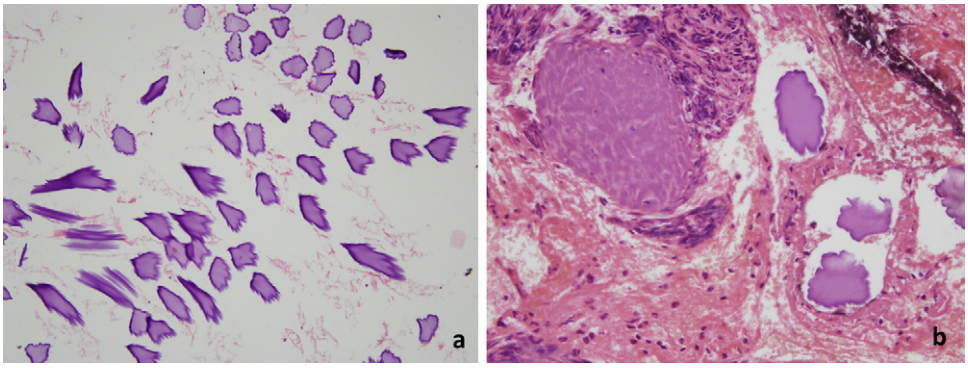

Fig. 5. (a) Homogenous, basophilic, irregular pieces of foreign material (HE, x100). (b) Inflammation and fibrosis surrounding foreign material (HE, x200).

most characteristic microscopic feature is interlacing bundles of fibers cut in alternating cross-sections and longitudinal sections.[13] The fibers are solid in the native state, whereas, in surgical specimens they often appear as hollow "ghost" fibers surrounded by blood breakdown products and inflammatory reaction.[13] The material is absorbed in 7–14 days, commencing within 24 h.[14] The radiologic findings on CT reveal focal or linear collections of gas within masses with mixed attenuation located in or near the operative site, and sometimes containing pockets of air can be seen.[15] These gas pockets are linear and often tightly packed. Other distinguishing features include absence of contrast enhancement and absence of air fluid levels.[14] After 14 days the pockets of air are starting to be replaced by soft tissue and thereafter a foreign body granuloma may form. Complete resorption occurs in 8 weeks.[16] Similar to the present case, such soft tissue masses when persistent can mimic a neoplastic lesion and become a diagnostic challenge.

Inflammatory reactions secondary to foreign bodies (FB) or HAs forming granulomas are well known. Postsurgical FB granulomas can be the result of inflammation, operative trauma, or a foreign-body reaction. Foreign body granulomas are histiocytic, inflammatory response to a FB consisting of modified macrophages with multinucleated giant and epithelioid cells usually surrounded by lymphocytes. These cells are apposed to the surface and encompass the FB. The foreign material can usually be identified in the center of the granuloma, particularly if viewed with polarized light, in which it appears refractile.[17] In 1949 the 'retention of Oxycel syndrome', a product very similar to Surgicel®, was reported describing fatal complications.[7] The first case of oxidized cellulose granuloma was described by Ito et al. following craniotomy.[18] Surgicel granuloma following LNSS was first and only described by Agarwal et al.[16] It can resemble abscess or hematoma in radiologic findings in case of early postoperative imaging.[19] Xanthogranulomatous pyelonephritis, inflammatory pseudotumor and invasive carcinoma are the other differential diagnoses.[15,20]

It is not our routine practice to leave ORC onto the incised renal paranchyma after sliding-clip renorrhaphy. Nevertheless, the material was placed for an oozing from the perinephric area which occurred while liberating the kidney. The ORC was not absorbed within 8 weeks and the post-operative imaging studies revealed a mass confused as recurrent tumor. We do not have evidence to explain why ORC caused the observed reactions. We believe it to be the culprit. Whether there are any unknown promoting factors that may trigger such reactions in some individuals, but not in most others, needs further observational studies.

ORC is a valuable HAs regarding safe control of minor bleeding, therefore its use should not be discouraged. Such adverse reaction should be taken into account in case of its use and early tumor progression. Biopsy may be advised for definitive diagnosis.

4. Conclusion

Hemostatic agents are widely used in LNSS and ORC is one the most frequent used in this field. Retained ORC granuloma has been reported in the literature imitating different entities, including invasive carcinoma. Thus it is of utmost importance, if ORC was used during resection, the location and use of this material is known precisely.

Conflict of interest statement

None.

Funding

None.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Authors' contribution

Baris Yucel, Yasemin Ozluk and Isin Kilicaslan have done data collection. Besides writing the content, Tzevat Tefik has done data analysis along with Tayfun Oktar. Before getting into content writing, Oner Sanli has involved with study design together with Isin Kilicaslan.

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